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# INTERIM REPORT ON THE UNITED NATIONS/EUROPEAN SPACE AGENCY TRAINING COURSE FOR FRANCOPHONE AFRICAN COUNTRIES ON APPLICATIONS OF THE EUROPEAN REMOTE SENSING SATELLITE DATA FOR NATURAL RESOURCES, RENEWABLE ENERGY AND THE ENVIRONMENT

(Frascati, Italy, 19-30 April 1993)

## A. Background and objectives

1. At its thirty-seventh session, the General Assembly adopted resolution 37/90 of 10 December 1982, in which it endorsed the recommendations of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE 82). These included recommendations that the United Nations Programme on Space Applications should promote the growth of indigenous nuclei and an autonomous technological base in space technology in developing countries and should promote greater cooperation in space science and technology between developed and developing countries as well as among developing countries.

2. The Committee on the Peaceful Uses of Outer Space, at its thirty-fifth session in June 1992, endorsed the activities of the United Nations Programme on Space Applications for 1993 as proposed by the Expert on Space Applications and as recommended by its Scientific and Technical Subcommittee at its twenty-ninth session. Subsequently, the General Assembly, by its resolution 47/67 of 14 December 1992, endorsed the activities of the Programme on Space Applications for 1993.

3. In response to Assembly resolution 47/67, and in accordance with the UNISPACE 82 recommendations, the Programme on Space Applications included, as part of its activities for 1993, the organization of a training course for francophone African countries on applications of the European Remote Sensing Satellite (ERS-1) data for natural resources, renewable energy and the environment. The present report describes the objectives and organization of the course. A full report will be presented to the Committee on the Peaceful Uses of Outer Space at its thirty-seventh session, scheduled for June 1994.

4. The United Nations/European Space Agency Training Course for Francophone African Countries on Applications of the European Remote Sensing Satellite Data for Natural Resources, Renewable Energy and the Environment was organized in cooperation with the Department for Development Support and Management Services of the Secretariat and the European Space Agency (ESA).

5. The objectives of the course were (a) to provide to participants from francophone African countries with a theoretical basis and practical experience in various aspects of microwave remote sensing, focusing on the applications of that technology to natural resources, sources of renewable energy and, in particular, its use in conducting inventories and monitoring the environment; and (b) to familiarize the participants with the bibliography and archive of ERS-1 materials and data available at the European Space Research Institute (ESRIN) of ESA at Frascati, Italy.

## B. Organization of the course

6. The course was held from 19 to 30 April 1993 at Frascati, Italy. It was attended by 24 participants from the following countries and regional institutions: Algeria, Angola, Benin, Burundi, Cameroon, Central African Republic, Chad, Comoros, Côte d'Ivoire, Egypt, Guinea, Guinea-Bissau, Mali, Mauritania, Morocco, Niger, Senegal, Tunisia and Zaire; and the Regional Centre for Training and Applications in Agrometeorology and Operational Hydrology (AGRHYMET) at Niamey, the Ouagadougou Regional Remote Sensing Centre (CRTO) and the Regional Centre for Services in Surveying, Mapping and Remote Sensing (RCSSMRS). Financial support to defray the cost of air travel and living expenses of the participants was provided by the United Nations Trust Fund for New and Renewable Sources of Energy. The programme for the course was developed jointly by the Office for Outer Space Affairs of the United Nations and ESA. The lecturers for the course were from France and from CRTO and ESA.

7. The course provided the participants with the physical theory on which remote sensing, both active and passive, is based. The course presented an overall view of remote sensing in various intervals of the electromagnetic spectrum, including the visible, infrared and microwave regions of the spectrum. Regarding microwave remote sensing, the course included the theory and concepts of synthetic aperture radar (SAR) image formation and an introduction to digital image processing of radar data in oceanographic, geologic, topographic and cartographic applications. The course also provided the participants with examples of applications of the data received from various instruments on board ERS-1 and with hands-on experience in digital processing its images.

8. The presentations made by the lecturers, and a number of participants, included case-studies of programmes or projects conducted in Africa. During the evaluation portion of the course, the participants expressed, among other things, the following concerns: (a) having been exposed to the benefits to be gained from the use of satellite images in their ongoing projects, they wished that additional hands-on training opportunities could be provided and that eventually they could gain access to radar data; and (b) as a first step towards reaching that goal, they wished that ways and means could be found by which information on projects, particularly those conducted in Africa, could reach their institutions. In response to those concerns, the Office for Outer Space Affairs and ESA indicated that, as a first step, they would provide assistance to establish a network of national and regional focal points that could facilitate the flow of information between African institutions and the international space community and that, as a second step, they would explore the possibility of providing assistance to upgrade existing regional institutions so that those institutions could provide the desired additional training and practical opportunities.